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It can not be cultivated upon any of the ordinary laboratory media, even if this contains the blood of susceptible animals. But it can be isolated on the coagulated egg-yolk recommended by McCoy and Chapin. It is more convenient to resort to animal inoculation for a diagnosis than to attempt to grow the organism in cultures, as this sometimes fails even when the conditions for growth seem favorable. Guinea pigs usually die of the disease in about three days and rabbits in from three to six days.

The lesions found postmortem in guinea pigs, rabbits, and ground squirrels are very much alike and are characteristic. At the point of inoculation, e. g. in the subcutis, one finds a dry, yellowish exudate. The congested vessels radiate from this area to the regional glands, which are enlarged, firm, and white on section, and lie buried in the very much congested periglandular tissues. The spleen and liver are congested and hypertrophied and appear speckled with numerous yellowish-white foci of necrosis. The vessels of the heart and thorax are deeply injected. The lungs sometimes show a few small tubercle-like foci of necrosis or more commonly patchy red areas of consolidation.

Prophylaxis.—In the present state of our knowledge concerning the infection of man with this virus it would seem advisable to at least warn those who dissect rabbits of the danger of infection, and to urge an unusually thorough scrubbing of the hands and of any other objects which may have come in contact with possibly infectious material.

PLAGUE AND PLAGUE-LIKE DISEASE.

A REPORT ON THEIR TRANSMISSION BY STOMOXYS CALCITRANS AND MUSCA DOMESTICA.[1]

By N. E. WAYSON, Assistant Surgeon, United States Public Health Service.

The possible rôle of the stable and the house fly in the transmission of a plague-like disease affecting rodents (A Plague-like Disease of Rodents, Public Health Bulletin No. 43, April, 1911, by G. W. McCoy) to human beings was suggested by the occurrence of a human case of conjunctivitis with cervical adenitis and considerable systemic disturbance in a meat cutter who worked in a restaurant, the location of which was not far removed from an epizootic among rabbits. The case was caused by an organism simulating, or identical with, that which causes the plague-like disease among the rodents of California, especially the ground squirrels. (*Bacterium tularense*, the Cause of a Plague-like Disease of Rodents, Public Health Bulletin No. 53, G. W. McCoy and Charles W. Chapin; Infection of man with *Bacterium tularense*, Journal of Infectious Diseases, September, 1914, William B. Wherry and B. H. Lamb.)

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[1] Submitted for publication Nov. 11, 1914.

This disease, the morbid pathology and causative agent of which have been described by the above-mentioned authors, has been found again this year during the routine examination of ground squirrels for the presence of plague in connection with plague-eradicative measures in California.

The causative organism readily lends itself to transmission by the house fly because of the high degree of susceptibility in rodents. There is no difficulty in causing the death of an animal by rubbing a small portion of an infected organ into the hair, without more trauma than would be made by using a pair of anatomical forceps for holding the material, no clipping or shaving of the skin being necessary, as in the vaccination method for production of experimental plague. Likewise, a drop of a dilute suspension of an infected spleen in sterile normal salt solution, applied to the conjunctiva of a guinea pig, prepared by cocainizing and traumatizing by rubbing a grain of sterile sand under the palpebra, will cause the death of the animal within the usual incubation time, to wit, five or six days.

Stable flies, held captive in a glass phial covered with a single layer of surgical gauze, will readily attack the clipped skin of a guinea pig and the unprepared ear of a Belgian hare, especially after a night of fasting. When so applied to an animal (guinea pig) acutely ill of this plaguelike disease, or of plague bacteremia, eight bites by one or more flies (not over two have been used simultaneously) will effectively transmit the disease to a healthy animal, if the application is made within an hour after the flies have bitten the affected pig, and the death of the second animal will occur in from five to nine days after the application. Washings of the flies in normal salt solution and of flies slightly crushed when injected subcutaneously will produce similar results.

House flies allowed to crawl and feed on the infected viscera of an animal dead of the plaguelike disease, and immediately transferred to conjunctivæ prepared as above indicated, cause a severe purulent conjunctivitis after 48 hours; later, hypopyon, with marked pannus, and after five to nine days, the death of the animal, with cervical adenitis and typical findings in the viscera. The feces of house flies similarly fed, suspended in salt solution and instilled into the conjunctiva, will produce like results.

The transmission by bites occurs, apparently, only from those animals having an advanced stage of the bacteremia, as indicated by their death within 24 to 48 hours after the fly feeding. Microscopic preparations of the blood as control indicators of the degree of bacteremia are uncertain.

The minimum number of bites necessary for transmission has not been determined. In two experiments where flies were allowed to bite the infected animal four times and the healthy animal four times death did not occur. In two experiments where flies were allowed to bite an infected animal eight times and to bite a healthy animal eight times, death resulted. It is assumed, of course, that all the animals were equally susceptible.

The determination of the length of time that flies remain infectious is in process of experimentation. Results have been negative after 24 hours from the time of feeding.

Transmission of Plague by Stomoxys calcitrans.

Strain.	Pig.	Fly bites.	Original pig.	Healthy pig exposed to bites.
(1) 3081	Adult male	8	Dead 24 hours later	Dead on seventh day.
(2) 3081	Adult female	8	do	Dead on eighth day.
(3) 3081	do	19	Dead 96 hours later	Remained alive.

Two experiments were made using flies which had bitten the infected pig used in No. 3, respectively 24 hours and 5 days after biting the original pig. Both resulted negatively.

Transmission of Plaguelike Disease by Stomoxys calcitrans.

Strain.	Pig.	Fly bites.	Original pig.	Healthy pig exposed to bites.
(1) 3045	Male	13	Dead 72 hours later	Remained alive.
(2) 3045	Female	14	do	Do.
(3) 3106	do	12	Dead 48 hours later	Dead on sixth day.
(4) 3106	do	8	do	Dead on ninth day.
(5) 3106	Male	8	Dead 24 hours later	Dead on fifth day.
(6) 3045	Female	8	do	Dead on sixth day.

Transmission of Plaguelike Disease by Musca domestica.

Four flies selected from a number that had fed on the 48-hour old viscera of an animal dead of plaguelike disease were washed and slightly crushed in 2 cubic centimeters of salt solution, and 1 cubic centimeter of the suspension was injected subcutaneously into a pig, with the result that death occurred on the fifth day.

Five flies were washed without crushing, after feeding on similar material, in 2 cubic centimeters of salt solution, and 1 cubic centimeter of the suspension was injected subcutaneously. Result, death on the sixth day.

Five flies were allowed to feed and crawl on similar material and were immediately transferred to and allowed to crawl on a conjunctiva prepared by cocainization and traumatized by rubbing a few grains of sterile sand between the ocular and palpebral conjunctiva. This resulted, in 48 hours, in a purulent conjunctivitis; in 72 hours, in pus in the anterior chamber and in a pannus; death occurred on the sixth day. Repetition of this experiment three times has resulted similarly.

A number of flies, after feeding in the carcass of an animal dead of the plague-like disease 48 hours previously, were allowed to crawl over an area of the skin of a healthy animal, prepared by shaving sufficiently close to produce an abrasion. Results, negative.

The above-outlined experiments are being extended and repeated for the purpose of learning whether the transmission of the plague-like disease from the carcass of an infected animal to the eye or mucous membranes of another animal, or to an abraded surface, is likely to become a factor of importance. Further information is also desirable regarding the transmission of plague by the stable fly, since this fly will feed on carcasses recently dead. Definite information might explain the occurrence of cases of this disease which do not lend themselves readily to an epidemiological explanation by flea transmission.

THE TUBERCULOSIS PROBLEM IN RURAL COMMUNITIES.

ITS MODERN ASPECT AND THE DUTY OF HEALTH OFFICERS.

By S. ADOLPHUS KNOPF, M. D., New York, N. Y.

On September 16, 1914, upon the invitation of the commissioner of health of New York State, I delivered an address at Saratoga Springs before the 700 sanitary officers of the State, assembled there for their annual conference. What I have seen, read, and learned from conversations with health officers in rural communities in other States, Territories, and in our Spanish-American possessions has convinced me that the conditions in those localities, while perhaps not exactly the same, still do not differ very materially from conditions in the State of New York. It would seem, therefore, that the publication of the address in the report of the United States Public Health Service, so widely read by the surgeons of the Public Health Service by health officers throughout the country, and by sanitarians and hygienists in general, might be helpful to some in their work of dealing with the tuberculosis problem in smaller communities. I have added some important items which, for want of time, I could not discuss when the address was delivered, but which I have reason to believe will enhance whatever value this communication may possess.

When I was first asked to speak on the subject of the tuberculosis problem in rural communities, I could not for the moment think that there should be any great difference between the tuberculosis problem in the city and in the town or village; but after some reflection I could well see that there is indeed quite a difference in the method by